

RECEIVED  
JUL 25 2003  
TC 1700

Docket No. 50184

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICANT(S): Mori et al. EXAMINER: J. Chu  
U.S.S.N.: 08/726,613 GROUP: 1752  
FILED: October 7, 1996  
FOR: DYED PHOTORESISTS AND METHODS AND ARTICLES OF  
MANUFACTURE COMPRISING SAME

Commissioner of Patents  
P.O. Box 1450  
Arlington, VA 22313-1450

**DECLARATION UNDER 37 CFR 1.131**

The undersigned declare as follows:

1. We are co-inventors of the above-identified application ("the application") assigned to the Shipley Company.
  2. Prior to June 1996, we had conceived of, made and lithographically processed photoresist compositions that contained a photoacid generator, a resin binder and a polymer dyes that contained one or more polycyclic chromophores that could reduced undesired reflections of exposure radiation. We found that preferred chromophores were those that contained carbocyclic or heterocyclic polycyclic moieties, such as anthracene. We also found that preferred dye compounds were polymeric.
-

Mori et al.  
U.S.S.N. 08/726,613  
Page 2

3. Prior to June 1996, one or more of us had coated such photoresist compositions onto substrates, particularly microelectronic (silicon) wafers, exposed the applied photoresist layers to activating radiation particularly radiation having a wavelength of 248 nm, and then the latent image formed in those photoresist layers were developed to provide a photoresist relief image by treating the exposed resist layers with an alkaline aqueous developer solution. As evidence thereof, attached as Exhibits 1 and 2 are true copies with dates deleted of notebook records of one of us. The disclosure attached as Exhibits 1 and 2 was generated, and actual experimental work disclosed therein was performed, prior to June 1996. Exhibit 1 shows that photoresists with dye compounds were prepared to test lithography. As shown in Exhibit 1, the prepared photoresists included a resin that was a copolymer of vinylphenol and t-butylacrylate (Poly-E), an onium salt photoacid generator of di-t-butylphenyliodonium camphorsulfonate, a basic stabilizer of a lactate salt of tetrabutyl ammonium hydroxide, solvent of ethyl lactate and a dye compound. The dye compounds of the prepared photoresists included ANTMA/HEMA which was a copolymer of methylanthracene methacrylate and hydroxyethyl methacrylate having a molecular weight in excess of 5,000 as disclosed in Example 1 of the application. Exhibit 2 shows lithography results of such photoresists with specified dye compounds, including a photoresist containing having the dye compound of an ANTMA/HEMA polymer.

Mori et al.  
U.S.S.N. 08/726,613  
Page 3

4. We hereby further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issued thereon.

Date: \_\_\_\_\_

\_\_\_\_\_  
James M. Mori

Date: \_\_\_\_\_

\_\_\_\_\_  
James W. Thackeray

Date: \_\_\_\_\_

\_\_\_\_\_  
Roger F. Sinta

Date: \_\_\_\_\_

\_\_\_\_\_  
Rosemary Bell

Date: \_\_\_\_\_

\_\_\_\_\_  
Robin L. Miller-Fahey

Date: \_\_\_\_\_

\_\_\_\_\_  
Timothy G. Adams

Date: July 17, 2003

Thomas M. Zydowsky  
Thomas M. Zydowsky

Date: \_\_\_\_\_

\_\_\_\_\_  
Edward K. Pavelchek

Mori et al.  
U.S.S.N. 08/726,613  
Page 4

Date: \_\_\_\_\_

\_\_\_\_\_  
Mamuel DoCanto

Exhibit 1

Notebook No. 2512A  
Continued From Page 21

p1

PROJECT ESCAP dye

Prepare resists with dyes for lithographic evaluations.

Preparation: make up master batches of dyes and DTBP/DCS

2-Acetylphenanthrazine:	0.1987g	Anthracene:	0.2014g
FLEX:	19.6443g	FLEX:	20.2301g
% solids:	1.00%	% solids:	1.00%

Circumion:	3620g	ANTHRA/DCS use 5% solid prepared
FLEX:	36.159g	on page 12 (RB2512A-12A)
% solids:	1.0%	

DTBP/DCS:	2.0900g	FLEX LOT# FT876DA
FLEX:	18.4428g	DTBP/DCS LOT# ARE 1924-19-2
% solids	<del>1.0%</del> 10.1%	

All measurements were made on balance M.R.D. 12  
Solutions were placed on the rollers for mixing at 3:30 AM

Solutions were removed from the rollers at 9:00 AM. All are completely dissolved.

Make up resists with dyes to test lithography, absorbance

RB2512A-22A:	0% ANTHRA/DCS	Poly-E (KE-610), 3% DTBP/DCS, 0.2% TBAH, 0.5% PHASE in FLEX @ 16% solids
-22B:	2% 2-Acetylphenanthrazine	
-22C:	2% Anthracene	
-22D:	5% Circumion	
-22E:	No dye	

Lot #'s used:

Poly E:	KE-610 (solid)	TBAH: 10% solid prepared
DTBP/DCS:	ARE 1924-19-2 (10% solution)	by P. Hagerly
PHASE:	23555FC12892 (10% solution)	
FLEX:	FT876DA	

Continued on Page 23

Read and Understood By

Rosemary Bell  
Signed

Date

Sheri L. Alkay  
Signed

Date

Exhibit 2

Notebook No. 2512APROJECT ESCAP dyeContinued From Page 37

Sem Results cont'd

	Resolution, $\mu\text{m}$	Masking Linearity, $\mu\text{m}$	Focus Latitude		Exposure Latitude
			Optical, $\mu\text{m}$	Measured, $\mu\text{m}$	
XP-9549A	0.23	0.23	1.4	>1.0	$\pm 10.4\%$
with ANTMA/HEMA	0.23	0.23	1.2	1.4	$\pm 12.3\%$
with Acetylphenothiazine	0.24	0.20 0.24	1.0	>0.8	$\pm 10.5\%$
with Anthraquinone	0.23	0.23	1.2	1.6	$\pm 8.8\%$
with Curcumin	0.24	0.24	1.0	1.4	$\pm 7.9\%$

Note: Focus and Exposure Latitude were measured to  $\pm 10\%$  CD change. (CD =  $0.30\mu\text{m}$ )RB2510-B  
pg 38

Based on the above, the ANTMA/HEMA dye looks very promising. DPF is comparable to the control and the exposure latitude is better. Masking linearity for the dyed resist and control are the same.

Continued on Page

Read and Understood By

Rosemary Bell

Signed

Date

Shirish Alkappa

Signed

Date



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2. Prior to June 1996, we had conceived of, made and lithographically processed photoresist compositions that contained a photoacid generator, a resin binder and a polymer dyes that contained one or more polycyclic chromophores that could reduced undesired reflections of exposure radiation. We found that preferred chromophores were those that contained carbocyclic or heterocyclic polycyclic moieties, such as anthracene. We also found that preferred dye compounds were polymeric.

3. Prior to June 1996, one or more of us had coated such photoresist compositions onto substrates, particularly microelectronic (silicon) wafers, exposed the applied photoresist layers to activating radiation particularly radiation having a wavelength of 248 nm, and then the latent image formed in those photoresist layers were developed to provide a photoresist relief image by treating the exposed resist layers with an alkaline aqueous developer solution. As evidence thereof, attached as Exhibits 1 and 2 are true copies with dates deleted of notebook records of one of us. The disclosure attached as Exhibits 1 and 2 was generated, and actual experimental work disclosed therein was performed, prior to June 1996. Exhibit 1 shows that photoresists with dye compounds were prepared to test lithography. As shown in Exhibit 1, the prepared photoresists included a resin that was a copolymer of vinylphenol and t-butylacrylate (Poly-E), an onium salt photoacid generator of di-t-butylphenyliodonium camphorsulfonate, a basic stabilizer of a lactate salt of tetrabutyl ammonium hydroxide, solvent of ethyl lactate and a dye compound. The dye compounds of the prepared photoresists included ANTMA/HEMA which was a copolymer of methylanthracene methacrylate and hydroxyethyl methacrylate having a molecular weight in excess of 5,000 as disclosed in Example 1 of the application. Exhibit 2 shows lithography results of such photoresists with specified dye compounds, including a photoresist containing having the dye compound of an ANTMA/HEMA polymer.



4. We hereby further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issued thereon.

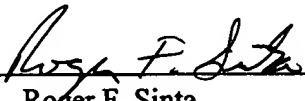
Date: \_\_\_\_\_

\_\_\_\_\_  
James M. Mori

Date: \_\_\_\_\_

\_\_\_\_\_  
James W. Thackeray

Date: July 17, 2003

  
\_\_\_\_\_  
Roger F. Sinta

Date: \_\_\_\_\_

\_\_\_\_\_  
Rosemary Bell

Date: \_\_\_\_\_

\_\_\_\_\_  
Robin L. Miller-Fahey

Date: \_\_\_\_\_

\_\_\_\_\_  
Timothy G. Adams

Date: \_\_\_\_\_

\_\_\_\_\_  
Thomas M. Zydowsky

Date: \_\_\_\_\_

\_\_\_\_\_  
Edward K. Pavelchek

Mori et al.  
U.S.S.N. 08/726,613  
Page 4

Date: \_\_\_\_\_

\_\_\_\_\_  
Manuel DoCanto

PROJECT ESCAP dyeContinued From Page 21

PI

Prepare resists with dyes for lithographic evaluations.

Preparation: make up master batches of dyes and DTBP10CS

2-Acetylphenanthrazine: 0.1987g

Anthracene: 0.2014g

ELEX: 19.6643g

ELEX: 20.2306g

% solids: 1.00%

% solids: 1.00%

Curcumin: 3630g

ANTMALHEMA: use 5% sol'n prepared

ELEX: 36.159g

on page 12 (RB2512B-12A)

% solids: 1.0%

DTBP10CS: 2.0900g

ELEX LOT# ET876DA

ELEX: 18.4428g

DTBP10CS LOT# ARC 1924-69-2

% solids: ~~1.0%~~ 10.1%

All measurements were made on balance MRA D 22.

Solutions were placed on the rollers for mixing at 3:20 pm.

Solutions were removed from the rollers at 9:00 am. All are completely dissolved.

Make up resists with dyes to test lithography, absorbance.

RB2512B-22A: 2% ANTMALHEMA

-22B: 2% 2-Acetylphenanthrazine

-22C: 2% Anthracene

-22D: 5% Curcumin

-22E: No dye

Poly-E (KE-610), 3% DTBP10CS,

0.2% TBAH, 0.5% PHASE

in ELEX @ 16% solids

Lot #'s used:

Poly E KE-610 (solid)

TBAH: 10% sol'n prepared

DTBP10CS: ARC 1924-69-2 (10% solution)

by P. Hagerd

PHASE: 23552F012892 (10% solution)

Continued on Page 23

ELEX: ET 876DA

Read and Understood By

Rosemary Bell  
Signed

Date

Shere L. Alkaya  
Signed

Date

PROJECT ESCAP dyeContinued From Page 37

Sem Results cont'd

	Resolution, $\mu\text{m}$	Masking Linearity, $\mu\text{m}$	Focus Latitude		Exposure Latitude
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Note: Focus and Exposure Latitude were measured to  $\pm 10\%$  CD change. (CD =  $0.30\mu\text{m}$ )

RB2512-B

pg 38

RB

Based on the above, the ANTMA/HEMA dye looks very promising. DOF is comparable to the control and the exposure latitude is better. Masking linearity for the dyed resist and control are the same.

Continued on Page

Read and Understood By

Rosemary Bell

Signed

Date

Shirley L. Allgood

Signed

Date



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Date: 7/16/2003

James M. Mori  
James M. Mori

Date: 7/16/03

James W. Thackeray  
James W. Thackeray

Date: \_\_\_\_\_

\_\_\_\_\_  
Roger F. Sinta

Date: 7/16/03

Rosemary Bell  
Rosemary Bell

Date: 7/16/03

Robin L. Miller-Fahey  
Robin L. Miller-Fahey

Date: 7/16/03

Timothy G. Adams  
Timothy G. Adams

Date: \_\_\_\_\_

\_\_\_\_\_  
Thomas M. Zydowsky

Date: 7/17/03

Edward K. Pavelchek  
Edward K. Pavelchek

Mori et al.  
U.S.S.N. 08/726,613  
Page 4

Date: \_\_\_\_\_

\_\_\_\_\_  
Manuel DoCanto



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ANTMALHEMA: use 5% sol'n prepared  
on page 12 (RB2512B-12A)

DTBP10CS: 2.0900g

FLEX: 18.6428g

% solids ~~10.1%~~ 10.1%

FLEX LOT# ET 876 DA

DTBP10CS LOT# ARC 1924-69-2

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by P. Hagerup

PHASE: 23552FO12892 (10% solution)

FLEX: ET 876 DA

Continued on Page 23

Read and Understood By

Rosemary Bell  
Signed

Date

Sheri L. Altraya  
Signed

Date

PROJECT ESCAP dyeContinued From Page 37

Sem Results cont'd

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pg 38

RB

Based on the above, the ANTMA/HEMA dye looks very promising. DOF is comparable to the control and the exposure latitude is better. Masking linearity for the dyed resist and control are the same.

Continued on Page

Read and Understood By

Rosemary Bell

Signed

Date

Sheri L. Mayo

Signed

Date



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**TC 1700**

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MANUFACTURE COMPRISING SAME

Commissioner of Patents  
P.O. Box 1450  
Arlington, VA 22313-1450

**DECLARATION**

I, Peter Corless, declare as follows:

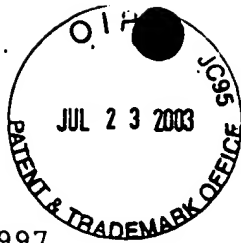
1. I am an attorney of record of the above-identified application ("the application"), which has been assigned by all the inventors to the Shipley Company. A copy of the recorded Assignment for the application is attached.

2. I have been informed that named inventor Manuel DoCanto is no longer employed by the Shipley Company. I sent by overnight mail to the known residence address of Manuel DoCanto a Declaration under 37 CFR 1.131 for Mr. DoCanto's review and signature. That overnight mail included an envelope with postage pre-paid for the signed Declaration to be returned to me by overnight service. I have not yet received the signed Declaration from Mr. DoCanto, or any other communication from Mr. DoCanto regarding the Declaration. I also have been informed by administration personnel of the Shipley Company that I should not expect to receive the signed Declaration from Mr. DoCanto.

3. I declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issued thereon.

Date: July 21, 2003

  
\_\_\_\_\_  
Peter F. Corless



UNITED STATES DEPARTMENT OF COMMERCE  
Patent and Trademark Office  
ASSISTANT SECRETARY AND COMMISSIONER  
OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

FEBRUARY 25, 1997

ROBERT L. GOLDBERG, ESQ.  
P.O. BOX 556  
MARLBOROUGH, MA 01752

PTAS

RECEIVED  
JUL 25 2003  
TC 1700



\*100328157A\*

UNITED STATES PATENT AND TRADEMARK OFFICE  
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, NORTH TOWER BUILDING, SUITE 10C35, WASHINGTON, D.C. 20231.

RECORDATION DATE: 10/07/1996

REEL/FRAME: 8275/0345  
NUMBER OF PAGES: 5

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

MORI, JAMES MICHAEL

DOC DATE: 09/26/1996

ASSIGNOR:

THACKERAY, JAMES W.

DOC DATE: 10/02/1996

ASSIGNOR:

SINTA, ROGER F.

DOC DATE: 10/01/1996

ASSIGNOR:

BELL, ROSEMARY

DOC DATE: 09/27/1996

ASSIGNOR:

MILLER-FAHEY, ROBIN L.

DOC DATE: 10/02/1996

ASSIGNOR:

ADAMS, TIMOTHY G.

DOC DATE: 09/27/1996

ASSIGNOR:

ZYDOWSKY, THOMAS M.

DOC DATE: 09/27/1996

8275/0345 PAGE 2

ASSIGNOR:

PAVELCHEK, EDWARD K.

DOC DATE: 10/03/1996

ASSIGNOR:

DOCANTO, MANUEL

DOC DATE: 10/04/1996

ASSIGNEE:

SHIPLEY COMPANY, L.L.C.  
455 FOREST STREET  
MARLBOROUGH, MASSACHUSETTS 01752

SERIAL NUMBER: 08726613

FILING DATE: 10/07/1996

PATENT NUMBER:

ISSUE DATE:

MAYA BENNETT, EXAMINER  
ASSIGNMENT DIVISION  
OFFICE OF PUBLIC RECORDS

OIPE  
 REC  
 JUL 23 2003  
 PATENT OFFICE  
 TRADEMARK  
 1113



100328157

SHEET

U.S. DEPARTMENT OF COMMERCE  
Patent and Trademark Office

Patent and Trademark Office  
**08/726613**

Attached original documents or copy thereof.

**2. Name and address of receiving party(ies)**

Name: Shipley Company, L.L.C.

Internal Address:

Street Address: 455 Forest Street

City: Marlborough State: MA ZIP: 01752

Additional name(s) & address(es) attached? ☐ Yes ☒ No

### 3. Nature of conveyance:

## Assignment

☐ Merger

## Security Agreement

☐ **Change of Name**

☐ Other

**Execution Date: 9/26/96, 9/27/96, 10/1-4/96**

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is: 9/26/96, 9/27/96,  
10/1-4/96

**A. Patent Application No.(s)**

B. Patent No.(s)

11100 U.S. PTO

Additional numbers attached? ☐ Yes ☒ No

12/19/96

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Robert L. Goldberg, Esq.

Internal Address:

Street Address: P.O. Box 556

City: Marlborough State: MA ZIP: 01752

**6. Total number of applications and patents involved:**

7. Total fee (37 CFR 3.41).....\$ 40.00

☒ Enclosed

☐ Authorized to be charged to deposit account

8. Deposit account number:

(Attach duplicate copy of this page if paying by deposit account)

**9. Statement and signature.**

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Robert L. Goldberg.

Name of Person Signing

Signature

**October 7, 1996**

Date \_\_\_\_\_

**Total number of pages including cover sheet, attachments, and document:**

**Mail documents to be recorded with required cover sheet information to:  
Commissioner of Patents & Trademarks, Box Assignments**

ASSIGNMENT

We, James Michael Mori of Dorchester, Massachusetts, James W. Thackeray of Braintree, Massachusetts, Roger F. Sinta of Woburn, Massachusetts, Rosemary Bell of Wayland, Massachusetts, Robin L. Miller-Fahey of Marlborough, Massachusetts, Timothy G. Adams of Sudbury, Massachusetts, Thomas M. Zydowsky of Cambridge, Massachusetts, Edward K. Pavelchek of Stow Massachusetts and Manuel doCanto of Stoughton, Massachusetts, for good and valuable consideration from Shipley Company, L.L.C., a Limited Liability Company of Delaware, having its principal place of business in Marlborough, Massachusetts, hereinafter called the Assignee, receipt of which is hereby acknowledged, do hereby sell, assign and transfer unto the Assignee, its successors and assigns, the entire right, title and interest in, to and under an application for Letters Patent of the United States, attached hereto and executed by us on the dates indicated below for Improvements in "DYED PHOTORESISTS AND METHODS AND ARTICLES OF MANUFACTURE COMPRISING SAME," and the inventions and any of them therein set forth and described, and any and all Letters Patent of the United States and of countries foreign thereto which may be granted thereon or therefor;

And for the above consideration we agree promptly upon request of the Assignee, its successors or assigns, to execute and deliver without further compensation any power of attorney, assignment, application, whether original, divisional, continuation or reissue, or other papers which may be necessary or desirable fully to secure to the Assignee, its successors and assigns, the inventions and any of them described in said application and all patent rights therein, in the United States and in any country foreign thereto.

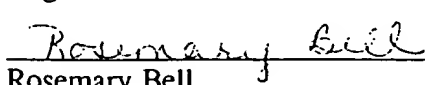
IN WITNESS WHEREOF,

I, James Michael Mori, hereunto set my hand and seal this 26 day of September, 1996,  
 I, James W. Thackeray, hereunto set my hand and seal this 2 day of October, 1996,  
 I, Roger F. Sinta, hereunto set my hand and seal this 1 day of October, 1996,  
 I, Rosemary Bell, hereunto set my hand and seal this 27 day of September, 1996,  
 I, Robin L. Miller-Fahey, hereunto set my hand and seal this 2 day of October, 1996,  
 I, Timothy G. Adams, hereunto set my hand and seal this 27 day of September, 1996,  
 I, Thomas M. Zydowsky, hereunto set my hand and seal this 27 day of September, 1996,  
 I, Edward K. Pavelchek, hereunto set my hand and seal this 5 day of October, 1996,  
 and I, Manuel doCanto, hereunto set my hand and seal this 4 day of October, 1996.

  
 James Michael Mori

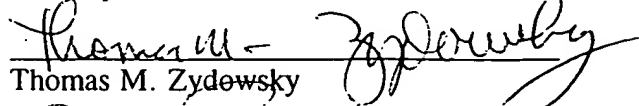
  
 James W. Thackeray

  
 Roger F. Sinta

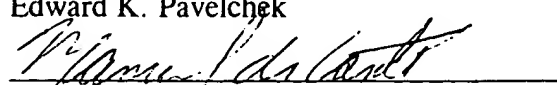
  
 Rosemary Bell

  
 Robin L. Miller-Fahey

  
 Timothy G. Adams

  
 Thomas M. Zydowsky

  
 Edward K. Pavelchek

  
 Manuel doCanto



Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 26<sup>th</sup> day of September, 1996, personally appeared James Michael Mori, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Thomas J. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 2<sup>nd</sup> day of October, 1996, personally appeared James W. Thackeray, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Thomas J. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 1st day of October, 1996, personally appeared Roger F. Sinta, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Thomas J. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 27<sup>th</sup> day of September, 1996, personally appeared Rosemary Bell, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 2<sup>nd</sup> day of October, 1996, personally appeared Robin L. Miller-Fahey, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 27<sup>th</sup> day of September, 1996, personally appeared Timothy G. Adams, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falcone

Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 27th day of September, 1996, personally appeared Thomas M. Zydowsky, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falco  
Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 3rd day of October, 1996, personally appeared Edward K. Pavelchek, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falco  
Notary Public

My Commission Expires: 8/25/2000

Commonwealth of Massachusetts

ss.

County of Middlesex

Before me this 4th day of October, 1996, personally appeared Manuel doCanto, who is to me personally known, and acknowledged the foregoing instrument of assignment to be his free act and deed.

Theresa H. Falco  
Notary Public

My Commission Expires: 8/25/2000